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ABSTRACT

Most instructional materials developed in the past 10-15 years do not provide for sufficient activities to allow the student to become involved in anything other than drill and memorization. Furthermore, in those situations where "communication activities" do occur, they are designed to teach the sentence as a structural, grammatical element of the language, rather than utterance as it is used in the performance of acts of communication. It is possible, desirable, and appropriate to structure class activities, even at the first stage of instruction, to emphasize "purposeful" communicative language use, i.e., where sender and receiver interact to accomplish a mutually defined goal or objective. This paper considers the theoretical and practical issues as they relate to the incorporation of actual communication training in the elementary level ESL class. The vehicle employed for communication training is the task-oriented dyad--a simple system which allows for face-to-face purposeful communication between two individuals while providing the opportunity to manipulate variables such as interactant characteristics, feedback availability and task difficulty. The paper, specifically considers dyadic communication tasks appropriate for teaching and testing skills in three broad categories of communicative speech acts--requests, manipulative instructions, and descriptions. Sample protype classroom-tested tasks are appended. (Author/CLK)

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DYADIC TASK-ORIENTED COMMUNICATION EXERCISES

for

TEACHING AND TESTING IN THE ELEMENTARY ESL CLASS

TESOL Conference
Miami, April, 1977

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ABSTRACT

Most instructional materials developed in the past 10-15 years do not provide for sufficient activities to allow the student to become involved in anything other than drill and memorization. Furthermore, in those situations where "communication activities" do occur, they are designed to teach the sentence as a structural, grammatical element of the language rather than utterance as it is used in the performance of acts of communication. Hence, theoreticians and teachers alike have jumped on the "communication bandwagon" but little has actually changed in the classroom.

It is possible, desirable, and appropriate to structure class activities, even at the first stage of instruction, to emphasize "purposeful" communicative language use, i.e. where sender and receiver interact to accomplish a mutually defined goal or objective. Rather than make another "bandwagon" appeal, in this paper the author considers the theoretical and practical issues as they relate to the incorporation of actual communication training in the elementary level ESL class.

The vehicle employed for communication training is the task-oriented dyad--a simple system which allows for face-to-face purposeful communication between two individuals while providing the opportunity to manipulate variables such as interactant characteristics, feedback availability and task difficulty. The author specifically considers dyadic communication tasks appropriate for teaching and testing skills in three broad categories of communicative speech acts--requests, manipulative instructions, and descriptions. Sample protype classroom-tested tasks are appended. [Charles A. Findley, Northeastern University, Boston.]

INTRODUCTION

Communicate and Communication are words that have been occuring with increasing frequency in the last few years in a variety of contexts in language learning. Many students view communication as a worthwhile goal but speaking exercises as a cross that they must bear, fraught with frustration, anxiety, and fear. Many teachers and program directors revere communication as a savior from low enrollments and lack of student interest. Communication is held up like a crucifix to ward off the evil spirits of grammar translation,pattern practice drills, and stilted dialogues. Teachers walk around the conference table chanting: Communicate, communicate, communicate! But, teachers go home and teach students different language structures and practice speaking sentences in a dialogue. Teachers alone are not responsible for the situation since most instructional materials developed in the past 10-15 years do not provide for sufficient activities to allow the student to become involved in anything other than drill and memorization. Therefore, rather than make another "bandwagon" appeal, in this paper I consider theoretical and practical issues relating to one communication training format, the task-oriented dyad, as it might be applied at the elementary level of language instruction.

A COMMUNICATION TRAINING METHODOLOGY

Form-Function Distinction: More and more, we are coming to the realization that students must be given the opportunity to

engage in actual communicative speech acts in order to achieve the ability to functionally communicate in the second language. The difference between language as an abstract entity and functional communication is rooted in the distinction between form and function. "A crucial distinction is between the 'sentence' and the 'act' it is used to perform. The unit of linguistic communication is not the symbol, word or sentence, but the production of those in the performance of an act." (Sinclair and Coulthard, 1975,14)

Language, the medium of interaction between sender and receiver, is utilized to fulfill a variety of functions by the speaker of the language. The first to develop and the most important to survival and successful interpersonal interaction is the instrumental. According to Halliday (1973) the first functional language model to develop in the child is the instrumental model, i.e. how to get what you need and want. This function involves use of language necessary to getting things, manipulating, and controlling others. This function is manifested initially by the English speaking child in such language forms as "I want..."; "I need..."; and "Give me...." As the child matures, other functions are added to the child's model of langauge and other more sophisticated linguistic forms are used to fulfill the basic instrumental function of language . The instrumental function takes on added dimensions in mature social interaction; the mature communicator has learned how to process information from a variety of sources in order to

accomplish many different purposes. Not only has the mature communicator learned how to meet his/her immediate and delayed needs, but also he/she has learned how to get and receive instructions and exchange information necessary to meeting one's own needs as well as the needs of others.

The distinction between form and function is becoming more precise and prevalent in our collective thinking. Unfortunately, the awareness is not being joined with action in the classroom, particularily at the elementary level of instruction.

It is possible, desirable, and appropriate to structure class activities, even at the early stages of instruction, to emphasize communicative language use in which sender and receiver interact to accomplish a mutually defined goal or objective. Interaction to achieve a mutually defined goal or objective is different from practice of sentence patterns or conversational dialogues. Real on-going interaction does not have a direct form to function correspondence; it is filled with one word utterances, false starts, pauses and mid-utterance corrections, to list only a few of the differences between standard textbook drill material and actual utterances.

Task-Oriented Communication Dyads: A theoretically sound and practical alternative to form-stressing instructional materials is to provide communication training in task-oriented dyads. Communication theorists, according to Harms (1973,16) recognize: "The dyad is organized by two and only two human communicators to achieve some mutual purpose. It is also known as person-to-

person communication, a conversational pair, a two-group, a speaker-listener pair, one-to-one communication, a two-person system, and by several other names." In the exercises discussed in this paper, the mutually defined purpose is a task. Thus, the two members of the dyad have a specified purpose for communicating and can see the outcome of their interaction in accomplishment of the task.

Below is the most basic model of dyadic communication applicable to a training situation. As you can see, in its simplest form, the training dyad has two interactants and an observer .

Insert Figure 1

In order for the members of a dyad to successfully exchange information in a purposeful fashion such as task completion, there is a constant shifting of roles. The initial speaker provides an instruction: if this instruction is not understood by (B), then (B) assumes the speaker role and requests additional information or further instructions. (A) may then try to modify his instruction in a way so that (B) can understand the instruction. Krauss and Weinheimer (1966) explain that in normal interaction the speaker's encoding of a message is highly dependent upon the feedback he receives from the listener. One of the goals of the speaker's behavior

is to have an effect on the listener, to modify his/her behavior in specific ways, e.g. to accomplish a task or change an attitude or belief. Through the listener's direct verbal and nonverbal feedback, the speaker is able to assess the effect of the message in accomplishing the intended purpose.

The task-oriented dyad is a valuable method for providing communication training in the language class. It allows for the natural operation of the communication process as described above and for the interaction and manipulation of variables significant to learning to accurately and effectively transmit and receive information. To illustrate the utility and flexibility of the task-oriented dyad in communication training, let us consider briefly how some of the major variables in the communication process can be manipulated utilizing this simple communication system. First, regard the interactants: (1) we might alter the background, experience, and degree of language competence of the memebers of the dyadic partners, e.g. pairing of native and non-native speakers would fall into this category;(2) we might vary the power/status positions so that we have dyads composed of equals and inferior-superior pairs, e.g. student-teacher;(3) we might also have male-female dyads or same sex dyads; or (4) we might want to arrange dyads so that one member has a real or imagined perceptual limitation such as blindness. Any worthwhile variation of interactant characteristics can be utilized in this format. Second, modification might focus on the nature of the message, for example written vs. oral messages. The amount of information available

to each interactant can also be controlled and manipulated. Third, we might consider variations in the channel of communication employed and the type of feedback options available. For example, (1) we could allow full visual and auditory feedback; (2) we could eliminate all visual feedback such as would occur with telephone conversation; or (3) we could introduce varing degrees of noise into the room to see if the students adapt their strategies to the situation. Fourth, the task or purpose for the dyad can be altered. As defined above, a dyadic communication system involves a mutual purpose. By specifing the task in advance, the teacher controls the function, the information processing load required as well as the social nature of the task. Tasks and corresponding purposes of interaction can be varied along a number of dimensions. Shaw (1963) outlined six of these dimensions:

Difficulty: the amount of effort required to accomplish the task.

Cooperation requirements: the degree to which integrated action is required vs. competitive behavior.

Intellectual-manipulative: the ratio of mental requirements , e.g. knowledge of the language code compared to motor requirements.

Population familiarity: the degree to which the task is similar to or representative of tasks encountered in the larger society.

Solution multiplicity: the degree to which their is more than one "correct" solution.

Intrinsic interest: the degree to which the task in and of itself is interesting, motivating, or attractive to the members of the dyad.

The preceding list of variations possible to achieve desired pedagogical outcomes, extensive as it may seem, is far from exhaustive. The possibilities for manipulation of the characteristics of the interactants, the message, the channel, and the task are only limited by the objective of instruction and the needs of the students.

TASK-ORIENTED DYADS IN TESTING

Communication dyads utilizing the same types of tasks which allow students to engage in purposeful communicative interaction, can also be utilized to test the ability of students. The tasks in their present stage of development are useful for proficiency testing: proficiency testing in this context is defined as how well the student uses the language in purposeful communication to exchange related information (Clark, 1972). However, if empirically scaled in terms of difficulty and prerequisite knowledge is determined for each task, a set of tasks could be used for diagnostic testing as well.

In proficiency testing the standard needs to be carefully specified. It can be specified in relation to either one of two criteria: (1) the average amount of time and accuracy score for learners of the language at the same level of learning or (2) comparison with native speakers on the same tasks. However, in an informal sense the students are testing their proficiency each time they attempt and complete a task in the

target language.

To utilize task-oriented dyads for testing global skills, the teacher can hold the task constant and employ it with all students or even better the teacher can use similar but different tasks at the same level of difficulty. (Reference to the list of task characteristics on page 6 will be helpful in selecting appropriate tasks.) Since students perform differently with different partners; in a testing situation, time and accuracy should be measured with a number of different partners and then averaged. Besides using the tasks that I have developed or ones that you yourself develop, it is possible to employ a set of standardized materials in the task-oriented dyadic format which utilize pencil and paper answer forms. DYCOMM: Dyadic Communication prepared by Burton Byers (1973a) provides an excellent illustration of standarized materials that utilize the communication dyad for teaching and testing. Although much of the material is too advanced for most elementary and intermediate level students, the format for testing and the difficulty level can be easily adapted to lower level students. Also Byers (1973b) reports on the use of these standardized materials in Singapore and how the materials were developed and tested. Both sources by Byers offer valuable insights into the mechanics of testing utilizing the dyadic communication format.

For testing that focuses on use of discrete forms in relation to accomplishing certain communication functions, it is possible to tape-record students working on the same or similar tasks. The task provides a constant and interesting

stimulus for assessment of skills in actual use. Once the recording has been made, the teacher is free to classify uses of the language code in reference to accomplishment of the particular function being tested.

CLASSROOM ARRANGEMENT

At this point it is useful to consider how to structure the classroom so that students can work with maximum efficiency during teaching and testing. In a small class with only two or three dyads such as in a tutorial there is not real logistical problem encountered. However, in the larger class a systematic structure is beneficial. The illustration below adapted from Harms (1973, 141) shows how the basic model of dyadic communication can be utilized in a large group situation.

Insert Figure 2

A similar type of arrangement is suggested by Byers (1973a,9) except the classroom model is a circle. In the circle arrangement there is an inner and outer circle of students facing one another. Various modifications can be made to suit the design

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Insert Figure 3

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of your room and the preferences of your students. However, the unique quality of the two models is that they illustrate

a method whereby students can move frequently to work with different dyadic partners with a minimum of confusion.

SUMMARY

Because of the critical need for communication training at the elementary level of instruction and the basic nature of the instrumental function at beginning stages of language learning, I have focused attention recently on development, testing, and refinement of tasks appropriate to this level and function. Samples of nine (9) different tasks with variations of each follow. The first task set is very basic and requires minimal knowledge of language forms to be accomplished. The tasks become progressively more difficult, requiring an expanded lexicon and knowledge of spacial arrangements and directions. The last task set, Task IX: A, B, and C is provided as a sample of an advanced level task in the same format. This last set is useful for preparation of students for introductory science experiments.

In summary, the different tasks and sub-routines of each have the following characteristics:

1. appropriate to communication testing and training in instrumental use of language;

2. allow for direct student to student interaction;

3. can be used in a two-person dyad with students at the same or different levels of proficiency or different personal characteristics;

4. can be used with either written or oral messages, although oral is the prime focus for the tasks at this level;

5. can be scaled according to difficulty;

6. require cooperation rather than competition for completion;

7. allow for variations in the availablity of feedback between speaker and listener;

8. are intrinsically interesting to students because they employ actual manipulation of objects rather than pencil and paper;

9. are student scorable with measurable outcomes; and

10. provide student speakers with immediate knowledge of understandability of the message by the listener.

While utilizing a limited knowledge of language forms and learning new vocabulary, students in a task-oreinted communication dyad are engaging in actual purposeful language use. In this learning system the student is actively involved rather than passively listening to teacher, tape, or drill. The student has the benefit of observable, immediate peer feedback so that the communicative value of the message is known directly. All in all, students approach the learning of communication through actual purposeful interaction rather than indirectly through pattern practice and drill.

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Figure 1

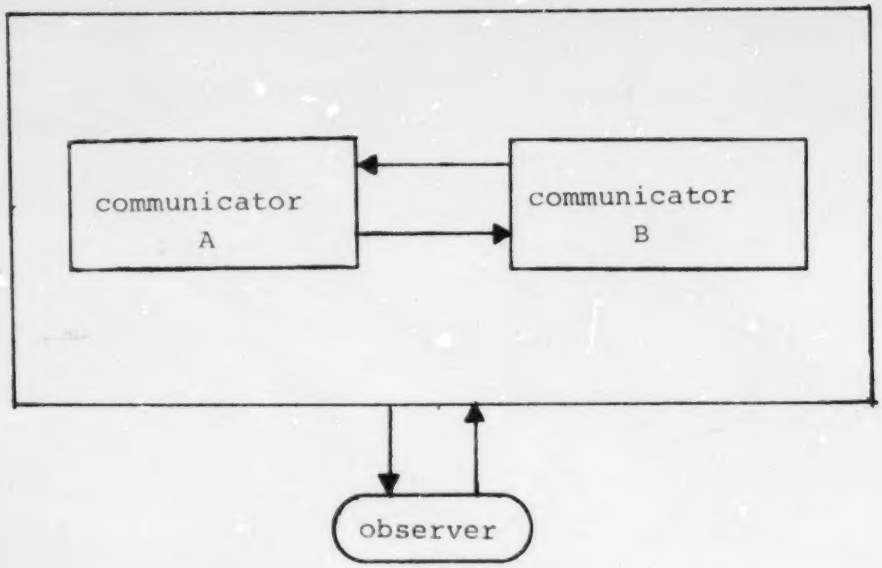
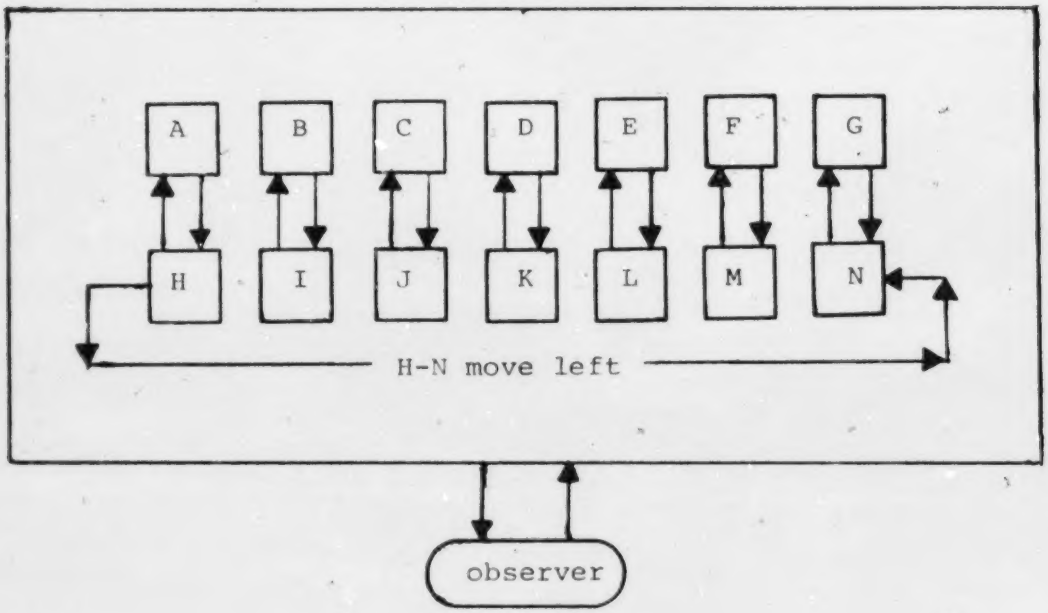


Figure 2



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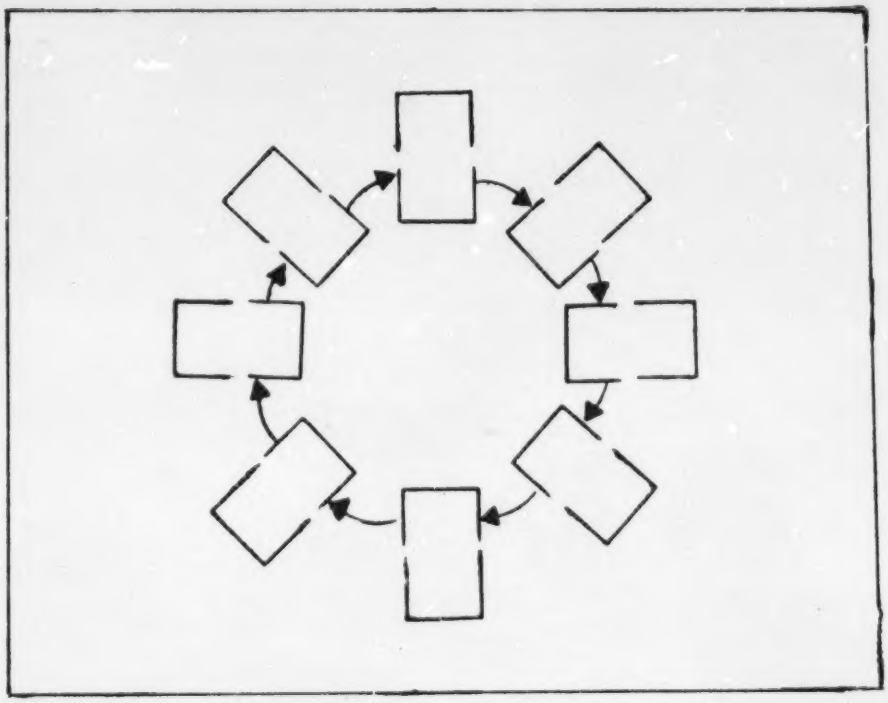


Persons sitting in the inner row of chairs are "Person A." Persons in the outer row are "Person A." After each task, Person A moves one chair to right.

Task I--Simple Requests and Object Exchange (Colors)

Task I--A

Materials: A box of 8 crayons (primary colors)

Instructions: Student B is given the 8 crayons. Student A is given the empty box.

Student A requests each crayon by color name from student B. The student can use the request form, "Give me _____."

Scoring Outcomes: One (1) point for each crayon returned to box.

Time to complete.

Task I--B

Materials: Randomly assorted box of crayons, colored pencils, and magic markers.

Instructions: Same as A above.

Task I--C

Materials: Same as B above.

Instructions: Student A now requests the crayons, pencils, and magic markers 2 or 3 at a time from Person B. Person B should ask questions for clarification if s/he doesn't understand. The student can use one of the simple request forms, as follows:

(1) "Give me a _____ (and) a _____."

(2) "Give me (not only) _____ (but also) _____."

(3) "Give me a _____, a _____, and a _____."

or other appropriate simple conjunctions.

Task I--D

Materials: Same as B above plus a deck of 12 4 X 6 cards on which has been written, "Not Polite," "Polite," "Very Polite," and "Extremely Polite."

Instructions: Student A should request the objects from the other person in language appropriate to one of four situational contexts:

(1) "Not Polite" = "Give me _____."

(2) "Polite" = "Please give me _____."

(3) "Very Polite" = "Would you please give me _____?"

(4) "Extremely Polite" = "Would you please be so kind as to give me _____?"

Student A turns up a card from the deck and then requests the object in whichever of the 4 styles is indicated on the face of the card. Student B is encouraged to respond in a manner to reflect the degree of politeness ranging from "Take it." to "I'd be happy to."

Task II--Simple Requests & Object Exchange (Also useful for vocabulary Teaching-Testing)

Materials: Small envelopes or boxes are filled with an array of miniature items appropriate to various situations or locations. (Contents of sample packets are listed below.)

Instructions: Student A is given the empty envelope or box and Student B is given the contents. (The same variations in language function and form can be employed as in Tasks I--B, I--C, and I--D.)

Scoring Outcomes: One (1) point for each object returned to the packet. Time to complete.

* * *

Outdoor Picnic

plastic knife
plastic fork
plastic spoon
packet of pepper
packet of sugar
packet of mustard
packet of mayonnaise
leaf
napkin
piece of glass
stone
lady bug (plastic)
used match

Packaging/Wrapping

string (long and short pieces)
twine
twine with knot
ribbon
brown wrapping paper
newspaper
stamp
gummed sealing tape
rubber band
masking tape
pen/
pencil
magic marker
address label

Task III--Physical Response

Materials: A set of pictures or drawings of the human body in different configurations, for example:

(1) standing with left hand touching head;

(2) sitting with right arm on lap;

(3) standing with left arm raised, and index finger pointing to ceiling;

(4) sitting with left hand touching nose;

(5) sitting with right hand touching lips.

(...Make a deck of a dozen cards.)

Instructions: Person A finds a partner. Person A and Person B are given the deck of cards. Person A draws a card and then tells B how to move parts of the body to match the figure in the picture. Person B should ask for clarification of any instructions s/he does not understand. After Person A is satisfied that s/he has given adequate instruction, A & B should check the picture against the position of B's body. Person B should select a card and follow the same procedure, alternating speaker and listener roles, until all cards in the deck have been exhausted

Scoring Outcomes: Time to complete deck.

Matching of person and picture.

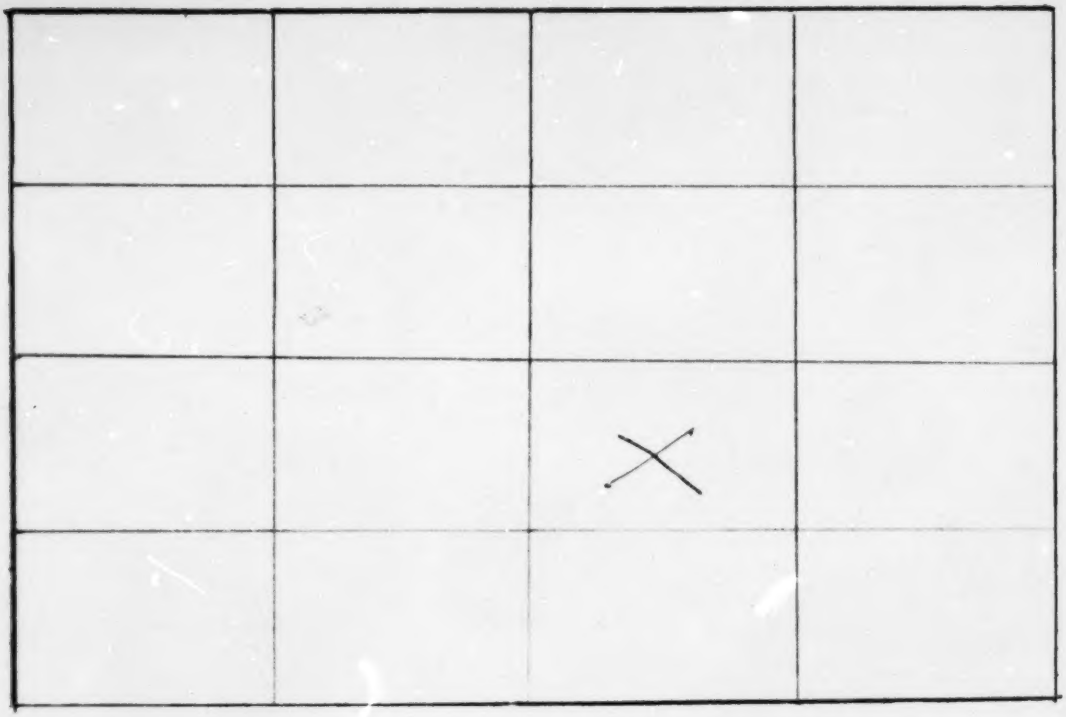
Task IV--Simple, Precise Requests for Information Involving Yes/No Questions

Materials: A set of 10 4 X 6 cards divided into 16 equal cells. An X is marked in a different cell on each card. (See illustration below.) Another set of "score" cards which contain 10 4 X 6 boxes divided into 16 equal cells but without X's.

Instructions: Person A selects a partner and secures the deck of marked cards and "score" cards. Person A draws the first card. Person B must locate the X by asking Person A for information regarding the location. (Questions such as: "Is it in the upper right half?" "Is it in the upper right box closest to the middle?" Quickly solve the problem and reinforce yes/no question formation.)

Person A and Person B should alternate roles of speaker and listener until the deck is completed.

Scoring Outcomes: Number of questions required to locate the X on each trial and if the student successfully located the X.



Task V--Giving Instructions (Object Assemblage)

Materials:

(1) A set of "Legos," "Tinker Toys," "Bristle Blocks," etc. which have parts that can be joined and taken apart easily.

(2) Five (or more) pieces are selected and assembled. Five identical pieces are put into a small packet unassembled. The task difficulty can be increased by including extra parts; this factor increases the amount of information necessary to select the correct part.

Instructions: Person A selects an assembled design and the packet of identical pieces. The design (or picture of the design) should be shielded from the view of Person B by a small screen, books, etc. Person A gives instructions to Person B so that s/he can assemble the pieces to make an identical reproduction of the assembled pieces. Person B should be encouraged to ask for clarification of any instructions that s/he does not understand.

FEEDBACK OPTIONS: (1) Person A is allowed to see Person B as s/he manipulates the objects following the instructions from Person A. This option provides immediate knowledge to Person A as to whether or not Person B understood the instructions. This option also reduces the necessity for Person B to ask for clarification since Person A will usually provide

[TASK V--continued]

instruction modification without it being requested.

(2) Person A is not allowed to see the task as Person B manipulates the objects. A small screen, books, etc. shields the task from Person A's view. This option doesn't provide for the same immediacy of knowledge of accuracy, but allows Person B to request clarification and additional information. In both feedback situations visual face-to-face eye contact is maintained and provides cues to the speaker and listener.

(3) Person A and Person B sit back-to-back. Thus, all visual feedback is eliminated. This option simulates the normal telephone channels of communication.

Task V--B--Request For Information (Object Assemblage)

Materials: Same as above.

Instructions: The instructions are the same except Person B elicits all information necessary for assembling the objects by asking Person A questions. The same three feedback options can also be employed.

Scoring Outcomes: One (1) point for each part correctly assembled. Time to complete.

Task VI--A--Giving Instructions (Object Placement)

Materials: (1) Sets of 4 X 6 cards upon which small, "flat" objects have been traced in identical size, and shape to the original object. Objects such as a penny, rubber band, needle, nail, tack, screw, toothpick, miniature screwdriver, plastic spoon, fork, knife, match, rock, etc. can all be included. Each card has 5 objects traced on it. (See illustration below.)

(2) There is an envelope corresponding to each card which contains the five small objects and a blank 4 X 6 card.

Instructions: Person A selects a task envelope and removes the card with the design traced on it and gives the blank card and small objects to Person B. Person B cannot see the design card until the end of the task. Person A gives instructions to Person B so that s/he can locate the objects on the blank card in the exact same location as the original. Person B should be encouraged to ask for clarification of any instructions that s/he does not understand.

FEEDBACK OPTIONS are the same as in Task V.

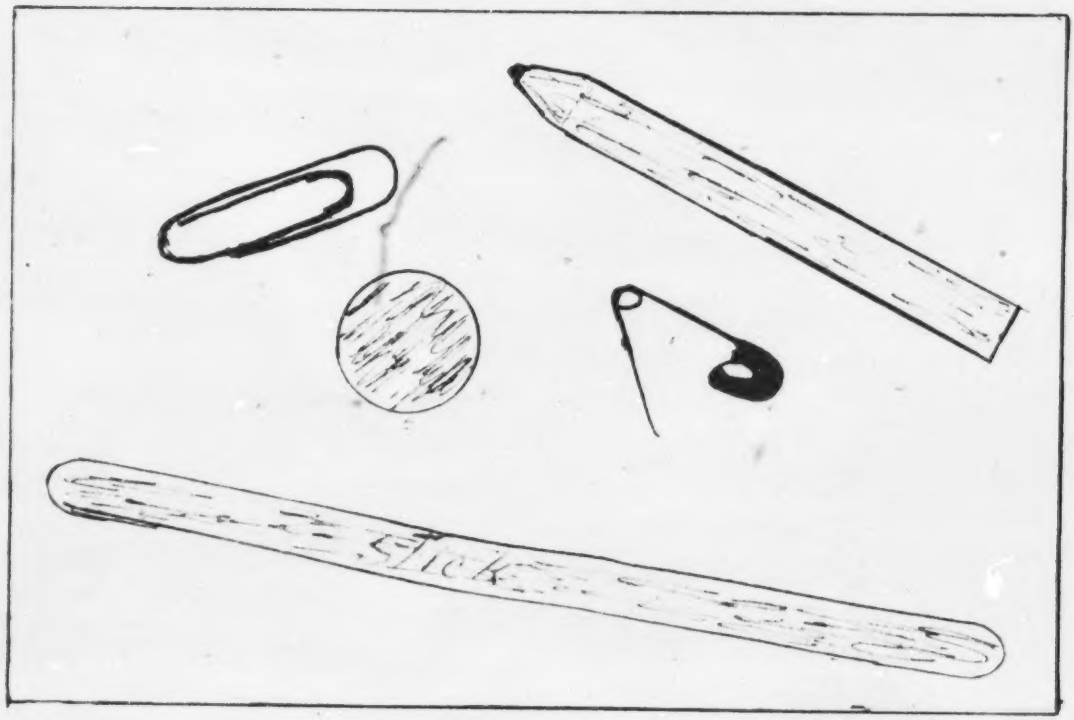
Task VI--B--Requests for Information (Object Placement)

Materials: Same as above.

Instructions: The instructions are the same except Person B elicits all information necessary for locating the objects by asking Person A questions. The same three feedback options can be employed as in Task V.

Scoring Outcomes: One (1) point for each object correctly located on the card.

Time to complete.



Task VII--A--Simple Directions (Maps)

Materials: (1) A set of maps upon which a small area has been outlined. Each map has a starting point, a route, and a destination marked.

(2) Maps identical to the ones in the set but without starting point, route, or destination marked.

The complexity of the map, the length of the route and the number of turns involved all increase the difficulty of the set of materials. (A low level sample is provided below.)

Instructions: Person A should select a marked map from the set. Person B should have an unmarked map. Person A should not show the map to the partner until the task is completed. Person A explains to Person B exactly how to follow the route to arrive at the destination. Person B should mark the route in pencil as s/he follows Person A's instructions.

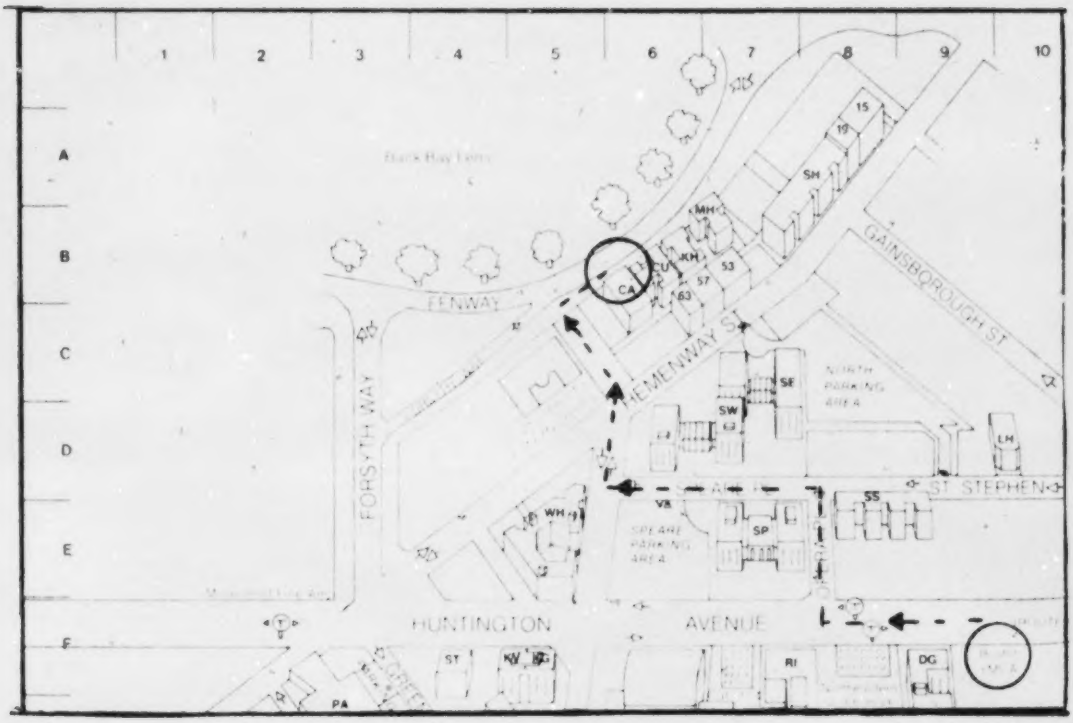
Task VII--B--Simple Request for Directions

Materials: Same.

Instructions: Same, except Person B now elicits all information by asking questions of Person A

Scoring Outcomes: Time to complete task.

Match of route and destination.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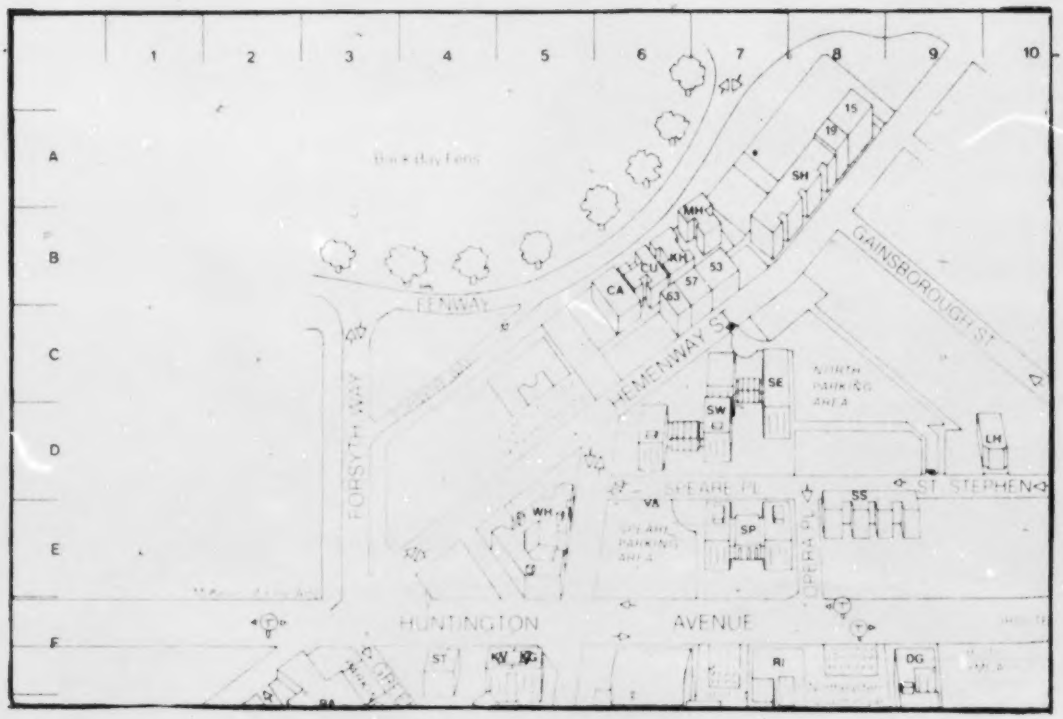
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VII-Simple Instructions (Drawing Task with Geometric Shapes)

Materials: (1) A set of 4x6 design cards with 5 geometric shapes arranged in a cluster; and/or

(2) A set of design cards with 3 geometric shapes connected with 2 lines. (See illustrations below.)

(3) Plastic template (plastic rectangle with various shapes cut out). I used the I.B.M. flow-charting template.

(4) Pencil with eraser.

(5) Blank card or dittoed block the same size as design cards.

Instructions: Person A induces another student to serve as the listener. Person A selects the design card. Person B has the blank block for drawing, a pencil, and template. Person A should explain to Person B how to draw an identical design in the blank space. Person B can not look at the design card until the task is finished.

VIII--B--Request for Instruction

Material: Same

Instuctions: Same, except Person B now elicits all information by interviewing Person A.

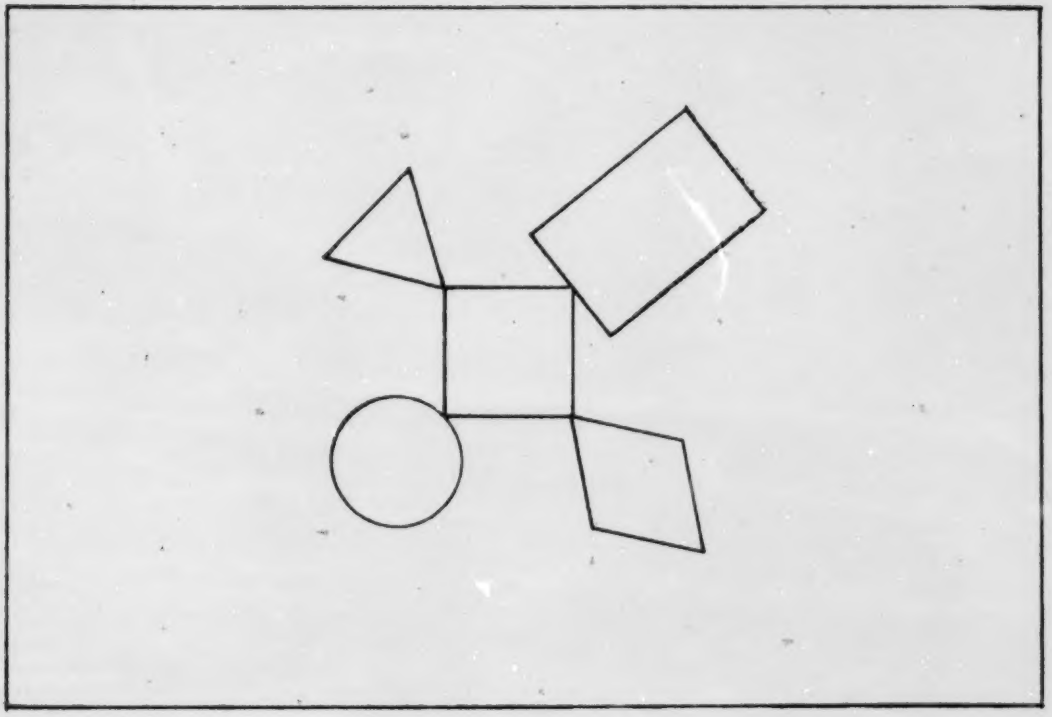
FEEDBACK OPTIONS are the same as in task V.

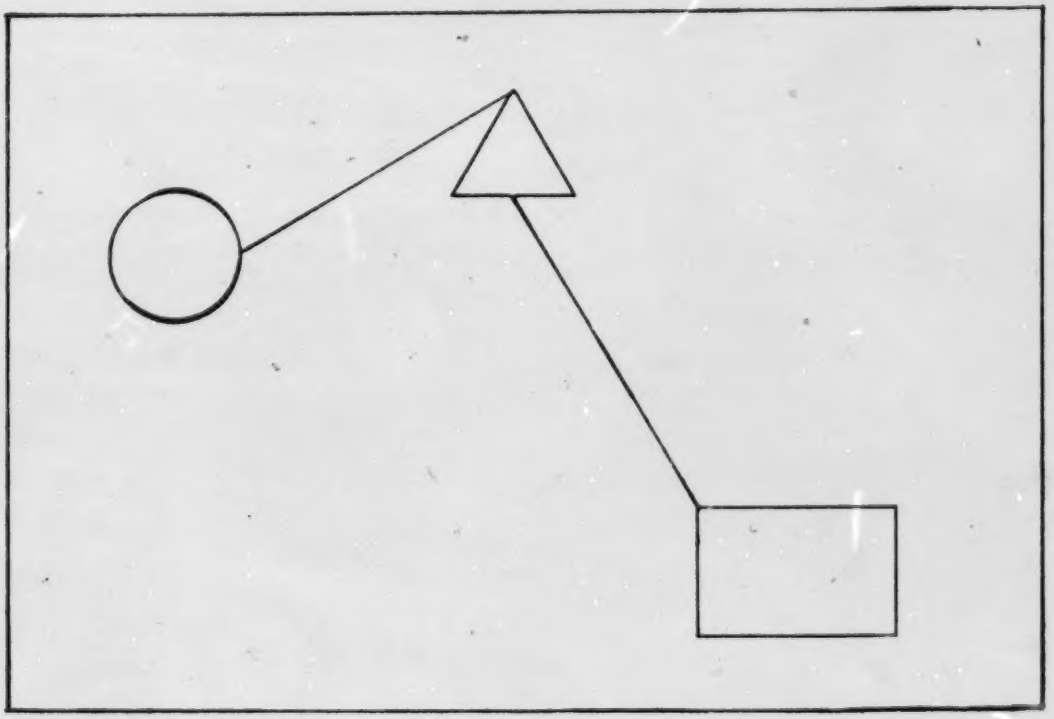
Scoring Outcomes: Time to complete task.

One point for each correct figure and one point for the

[VIII--B--continued]

location of the figure (10 points total). If the line drawings used, then score one point for the length of the line which should be approximately the same length and score one point for the location of the end points of the line. The line should end at the same location as the original.





Task IX --A--[1] Reading, Giving and Receiving

(Electric Bell)

Materials: (1) A dry cell battery; (2) three pieces of covered wire, about 12 inches long; (3) a push button switch; (4) a bell; and (5) set of instruction cards.

The material allows the student to construct a simple electric bell. Theoretical explanation according to Visner and Hechtlinger (1971) is:

> In order to be able to use the electricity stored in the dry cell, you must make a path through which electricity can travel. This path is called a circuit. If you connect one terminal of the dry cell with the help of a wire to the other terminal of the dry cell, you make a circuit in which electricity flows. By connecting the bell and push button as described in the experiment, you make them part of the circuit. They will receive electricity which makes the bell ring.
>
> The push button is a switch that can make or break the circuit. If you press down the button, a wire spring inside it touches the wire that is connected to the dry cell and the bell. That is how the push button makes a path for the electricity and makes your bell ring. If you lift your finger from the push button, its spring no longer touches the wire; the circuit is broken; the electricity cannot get to the bell and it will stop ringing.

Instructions: Person A is given a 4 X 6 card upon which are written the directions for wiring a simple battery powered bell. Person B is given a packet containing the materials. [If the task seems too simple for your students, either (1) add extra parts, and/or (2) eliminate visual feedback between the partners.] Person A should read the instructions silently and then explain to Person B how to connect the wire and parts. [See the sample

[Task-- IX --A--continued]

instruction card below.]

Scoring Outcomes: Time to complete task.

Accurately assembled apparatus.

Card 1

DO NOT SHOW THIS CARD TO YOUR PARTNER.

(1) Scrape off about one inch of the plastic covering from the ends of each piece of wire.

(2) Fasten one end of one wire to one terminal of the dry cell.

(3) Fasten the other end of the same wire to one terminal of the bell.

(4) Attach the second wire to the other terminal of the dry cell.

(5) Attach the other end of the second wire to one screw of the push button.

(6) Connect the third piece of wire to the other screw of the push button.

(7) Press down on the push button. THE BELL WILL RING.

Task IX--B--[1] Reading, Giving and Receiving Instructions

(Simple Electric Motor)

Materials: (1) Top of a round oatmeal box; (2) a pencil with an eraser end; (3) a spool; (4) a sewing needle; (5) a large snap fastener; (6) four [4] paper clips; (7) a large nail; (8) a dry cell; (9) 3 feet of covered copper wire; (10) set of instruction cards. The materials when properly assembled allow the students to produce a simple electric motor. Theoretical explanation according to Visner and Hechtlinger (1971) is:

> The aparatus you built works like a real electric motor. An important part of any electric motor is an electromagnet. Your electromagnet is the nail with the wire around it. When the wire is connected to the two terminals of the dry cell, your electromagnet will be magnetic and attract the paper clip near it. When you disconnect the wire, the electromagnet stops being magnetic and lets the paper clip go. By touching and taking away the wire over and over again, you can make your motor go as long as you want to.

Instructions: Person A is given a 4 X 6 card upon which are written directions for constructing a simple electric motor. Person B is given a packet containing the materials. Person A should read the directions silently and not show the card to Person B. After reading the directions, Person A explains in his/her own words, step by step, the procedure for constructing the motor. Person B may ask questions for clarification of instructions of Person A but Person A should not show the card to Person B. [See the sample instruction card below.]

[Task IX--B--continued]

Scoring Outcome: Time to complete task.

Accurately assembled apparatus.

DO NOT SHOW THIS CARD TO YOUR PARTNER Card 1

(1) Place the pencil in the hole of the spool. The sharpened point is in the hole and the eraser end is at the top.

(2) Push the needle into the center of the pencil eraser.

(3) Make a small hole in the center of the boxtop.

(4) Insert one part of the snap fastener in the hole in the boxtop.

(5) Snap the other part of the snap fastener over the first part from step 4 above.

(6) Hold the box top with the open side facing up.

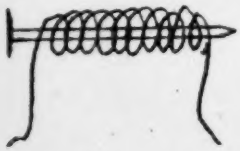
Card 2

(7) Place the paper clips on the rim of the box top at equal distances from one another.

(8) Put the box top on the needle, with the eye of the needle in the small hole of the snap fastener. (See the illustration on the left side of the card.)

(9) Scrape off the coverings from both ends of the wire.

(10) Wrap the wire around the nail from one end to the other, in one direction only.

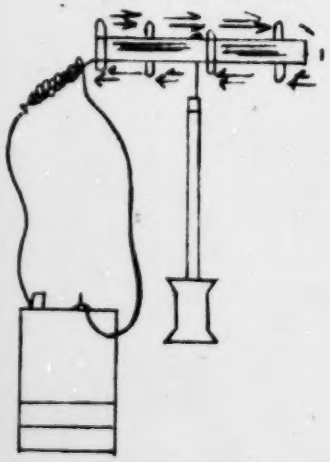


(11) Leave 8 inches of wire free at each end. (See the illustration on the left side of the card.)

Card 3

(12) Attach one end of the wire to one of the terminals of the dry cell.

(13) Hold the nail near one of the paper clips.



(14) Touch the unattached end of the wire to the other terminal of the dry cell. THE BOX TOP WILL TURN. (See illustration.)

(15) Repeat touching and taking away the unattached end of the wire, and the box top will continue turning.

Task IX--C[1]--Reading, Giving and Receiving Instruction

(Dipping Needle)

Materials: (1) Small bar magnet; (2) a knitting needle; (3) 2 darning needles; (4) a cork; (5) two [2] drinking glasses; (6) a compass; (7) protractor; (8) set of instruction cards.

The materials allow students to construct a simple "dipping needle" for approximating the dip of the earth in the city in which they are located.

Theoretical explanation according to Visner and Hechtlinger (1971) is:

> Our earth is a huge magnet whose magnetic poles are not too far from the geographical poles. The magnetic pole of the earth in the northern hemisphere is about 1400 miles away from the geographic north pole. There are magnetic lines of force around any magnet. The magnetic lines of force surround the earth in all directions, curving from one magnetic pole to the other. Your dipping needle will dip until it points exactly in the direction of the earth's magnetic lines of force. At the equator, the dipping needle will be about horizontal and at either pole of the earth, it will be vertical. At all other places on earth, the dipping needle will slant. The angle the dipping needle makes with the horizontal is called the angle of dip. At the equator, this angle is zero. At either of the poles, it is 90 degrees. In New York City, the angle of dip is about 72 degrees. Use your dipping needle to measure the angle of dip in your town.

Instructions: Person A is given a set of 4 X 6 cards upon which are written the directions for assembling the "dipping needle." Person B is given a packet containing the materials. Person A should read the directions silently and not show the card to Person B. After reading the

[Task IX--C--continued]

directions, Person A explains to Person B, how to (1) assemble the material; and (2) how to measure the angle of dip. (See sample instruction card below.)

Scoring Outcomes:

Time to complete task.

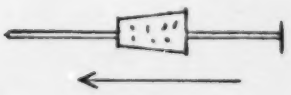
Accurately assembled apparatus.

Approximation of degree of angle.

DO NOT SHOW THIS CARD TO YOUR PARTNER Card 1

(1) To magnetize the knitting needle, stroke it in one direction many times from the middle to one end with one pole of the bar magnet. (See illustration below.)

(2) Push the magnetized knitting needle through the center of the cork, lengthwise. (See illustration below.)



Card 2

(3) Push the points of the darning needles into opposite sides of the cork. They must be crosswise to and exactly level with the knitting needle. (See illustration.)

(4) To determine which is the north pole of the knitting needle:

(a) Place the compass flat on the table

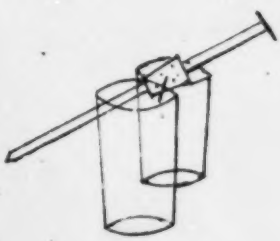
(b) Hold one end of the knitting needle toward the compass.

[The south pole of the compass needle will attract the north pole of the knitting needle.]

Card 3

(5) Place the two glasses side by side about one inch apart.

(6) Rest the two darning needles on the edge of the two glasses.



(7) The cork and knitting needles must swing freely between the glasses. (See illustration.)

(8) The north pole of the knitting needles must point north. Check it with the compass.

(9) The knitting needle is now a "dipping needle." It will dip toward the earth.

Card 4

(10) Hold the protractor perpendicular to the two glasses.

(11) Measuring from the center of the protractor, determine the approximate angle of dip in your town.

The approximate angle of dip is _____.

(Illustrations may be omitted if you wish to make the task more complex.)